THE AUSTRALIAN VIVIPAROUS RIVER SNAILS

By BERNARD C. COTTON

(Contribution from the South Australian Museum.)

Australian fresh-water snails have received little attention from investigators. The present paper deals with those included in the family *Viviparidæ*.

Commonly known in Europe and most countries of the Northern Hemisphere as "River Snails" or "Banded River Snails," they are peculiar in that they retain the eggs until hatched and so bring forth the young alive; the female shell is slightly bigger than that of the male in the European species.

The Viviparids are gill breathers and have a corneous, concentric operculum for closing the aperture of the shell. The snout is prominent, and the eyes are placed on short stalks outside the base of the tentacles. Living specimens are commonly found in the marginal mud of slow rivers and in lakes.

As might be expected, Australian species are peculiar and readily separable from those of other countries; they are all included in the two genera *Notopala* and *Centrapala*.[1] The former differs from the typical *Vivipara* principally by the microscopic granose spirals found in all Australian species of the genus, which may be, for convenience of identification, divided into two groups, A and B.

A. Without spiral colour bands.

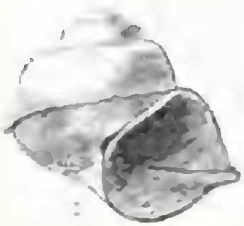
B. With spiral colour bands.

Notopala hanleyi Frauenfeld

Notopala hanleyi Frauenfeld (Fig. 1) is the genotype and occurs commonly in the Lower Murray. It is a fairly solid, globose shell with a dark green to greenish brown periostracum, and is of fairly common occurrence on Murray native camp sites, but not so common as the larger and more succulent fresh water mussel, *Hydridella australis* Lk. Closely related to *Notopala hanleyi* is an interesting fossil species, *Notopala wanjakalda* Cotton (after the native name for the type locality), which is found in the Murray River banks at Sunnyside, South Australia, at a height of forty feet above present river level. This remarkable fossil (Fig. 2) shows a complete range from smooth to prominently unicarinate forms which are never seen in living Australian species.

1. Cotton, B. C., *Rec. S. Aust. Mus.*, V, No. 3, pp. 339-344, 1935.

Although the next species, *Notopala sublineata* Conrad (Fig. 3) may have some indication of narrow colour bands in some specimens, it is usually unicoloured green, and comparatively rather coarsely spirally sculptured. There is also a tendency to acute angulation of the bodywhorl (the specimen illustrated is an extremely angulated individual), but this never approaches the prominent keel seen in *Notopala wanjakalda* Cotton. This angulation does, however, suggest a close relationship to the South Australian fossil, and one suspects that the latter has become extinct through climatic changes, and that the climate of the Lower Murray area may have been warmer than that of the present Darling River Area when *Notopala wanjakalda* Cotton was a living shell. A delicate, unicoloured light green species,



Notopala wanjakalda Cotton.

Notopala sublineata Conrad.

which occurs commonly at Innamincka, Cooper's Creek, S.A., appears to be unnamed, so that it is here described as:—

Notopala barrettii sp. nov.
(Fig. 5.)

Shell subglobose, conic, comparatively narrow, rather thin, smooth except for exceedingly fine spiral granose lirae; unicoloured pale yellowish green; bodywhorl rounded, umbilicus very narrow; whorls four plus the protoconch of one whorl; aperture subovate, a little pointed posteriorly; outer lip continuous with the columella; operculum corneous, concentric, a little pointed posteriorly, nucleus subcentral, nearer the columella margin. *Holotype* Height 21·5 mm., diam. 16 mm., Innamincka, Cooper's Creek, S.A., living, buried in river sand. S.A. Museum, D.11559. Named after Charles Barrett, the well-known Australian naturalist.

Notopala polita Marten (here re-named *Notopala gatliffi*, sp. nov., after the late J. H. Gatliff, as *polita* is preoccupied by Frauenfeld), from the Balonne River, Queensland, is very closely allied to *Notopala sublineata* Conrad, from the Darling River, N.S.W., but may be distinguished from the rounder whorls.

From Queensland comes *Notopala alisoni* Brazier, a microscopically spirally sculptured species, recalling *Notopala barretti* Cotton, but distinguished by its wider umbilicus and darker colour.

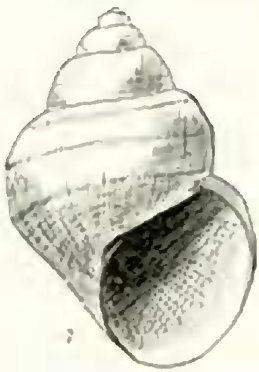
Notopala waterhousei Ads. and Aug.

Notopala barretti sp. nov.

A giant among the river snails of the spirally banded group is *Notopala waterhousei* Ads. and Ang. (Fig. 4) from North and Central Australia, attaining to about two inches or more in height. Although large, it is of delicate structure, dark brownish green and obscurely three banded above the periphery of the bodywhorl. In Central and Lower North Australia, *Notopala kingi* Ads. and Ang. is found. It has a tendency to obscure banding above the periphery, and is evidently a small relation of the former species, but rarely attaining to one-third the size.

Another banded species, from North Australia is *Notopala essingtonensis* Frauenfeld (Fig. 6), to which is closely allied

Notopala essingtonensis Frauenfeld.



Notopala tricincta Smith.

Notopala tricincta Smith (Fig. 7) also from North Australia, but on the latter there are three slightly raised dark brown spirals.

Notopala australis Reeve is another banded species which sometimes shows a tendency to angulation on the bodywhorl as in

Notopala sublineata Conrad. *Notopala affinis* Marten, from North-west Australia, is yet another banded species related to *Notopala essingtonensis* Frauenfeld.

Distinguished by its unique colouring, olivaceous above the periphery, greenish below, and livid purplish on the spire, *Notopala dimidiata* Smith, an obsoletely banded species from the Victoria River, North Australia, is easily separable from any other Australian species.

Centrapala lirata Tate (fig. 8), a depressed wide-mouthed, spirally sculptured species, is quite distinct from any other fresh-water snail known, and comes from Cooper's Creek at Innamincka.

From a perusal of the foregoing it is evident that some scheme of geographical distribution may be formulated for these river snails, but, as in the case of all fresh-water mollusca, there is a considerable overlapping of faunal areas, and also haphazard dispersal to contend with, which has led to many anomalies in local distribution.

The author[2] has recorded a case of the large fresh-water mussel *Hyridella australis*, Lk., being carried by the "Black Duck" *Anas superciliosa*, and this means could obviously be used to carry a creature otherwise incapable of passing from one area of water to another.

Wallis Kew,[3] cites numerous instances of isolated ponds becoming stocked with various fresh-water mollusca and plants within quite a short time after formation. Probably the chief factor in enabling this transportation of fresh-water species is their hardiness. River snails, like fresh-water mussels, will survive for weeks in the dried mud of rivers and lakes.

To quote Wallis Kew again[4] "an Australian *Unio*[5] . . . having already survived in a dry drawer for 231 days, packed up (after being tested in water) and forwarded to England, reached Southampton in a living state 498 days after its capture, and was subsequently 'restored to its element, with full vital powers,' in the care of Dr. Baird, of the British Museum."

The author would be pleased to receive specimens of fresh-water mollusca, accompanied with name of locality where found, and, preferably, with the animal intact.

2. Cotton, B.C., *S. Aus. Naturalist*, XV, 4, p. 113, pl. 11, 1934.
3. Kew, W., F.Z.S., "The Dispersal of Shells," pp. 7-26, 1893.
4. Kew, W., loc. cit., p. 28.,
5. *Hyridella australis*, Lk. probably.